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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/622,113	POHJOLA ET AL.	
	Examiner	**Art Unit**	
	LI LIU	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,8-16,19-21,23,30,32-36 and 38-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *35,36 and 38-42* is/are allowed.

6)☒ Claim(s) *1,4,8-16,19-21,23,30 and 32-34* is/are rejected.

7)☒ Claim(s) *43 and 44* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 November 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 11/19/2008 with respect to claims 1, 4, 8-16, 19-21, 23, 30 and 32-34 have been fully considered but they are not persuasive. The examiner has thoroughly reviewed Applicant's amendment and arguments but believes that the cited reference reasonably and properly meet the claimed limitation as rejected.

1). Applicant's argument – "Examiner has equated the Fabry-Perot semiconductor laser diode (F-P SLD) of Kim to the "optically pumped source" as claimed. Applicants respectfully disagree. Fig. 5 of Kim clearly shows that the F-P SLD is part of an ONU, i.e., *not* at the kerb location. Accordingly, the F-P SLD of Kim is not the same as the "optically pumped source" at the "kerb location" as claimed".

Examiner's response – The reference Kim et al is used to teach "a plurality of injection locking sources configured to receive injection light from an injection source outside the passive kerb location". The examiner does not state that F-P SLD of Kim is an "optically pumped source". The examiner clearly state "Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is "optically pumped source"" (page 6 of the Office Action sent on 8/21/2008).

The reference Morales et al teaches an optical access board OAB located at the kerb location (the access node AN), the OAB converts the data modulated wavelength (e.g., λa) into another wavelength λi, and the data signal carried on λi is transmitted to the hub or the switch center CE. Morales discloses that the wavelength conversion in OAB can "take place in the optical domain". And reference Stubkjaer teaches an optical

wavelength converter (e.g., Figure 1a) in which a data signal $\lambda1$ directly pumps the optically pumped source. The combination of Morales et al and Kim and Stubkjaer teaches the optically pumped source which receives the injection light from an injection source and the data modulated pumping light.

2). Applicant's argument – "there is no reason, motivation or suggestion to combine Morales, Kim, and Stubkiaer, or to modify the systems disclosed therein to arrive at the claimed embodiments. For example, Kim teaches using the "F-P SLD located at the optical network unit (ONU)" as opposed to single-port laser modulators at ONU to be more cost-effective "since it replaces multiple single-mode lasers and semiconductor optical amplifiers by a broad-band ASE source and low-cost F-P SLD's, respectively." ... Thus, the modified system of Kim would go back to employing single-port laser modulators at thus ONU, and thus become unsatisfactory for its intended purpose".

Examiner's response – First, in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location, and by using wavelength converter or optically pumped

source, “it is possible, first, to have, on the subscriber side, for a given type of service, very simple and identical network terminating units since they all work at the same wavelength, consequently the cost of manufacture, installation and maintenance is much lower than if there were different terminals as is the prior art”; and Kim at al and Stubkjaer teach an optically pumped injection locked low cost WDM source. Therefore, by combining Morales et al and Kim at al and Stubkjaer, a cost-effective, highly reliable and flexible WDM optical network system can be obtained.

Second, Kim et al compares the passive optical network PON employing the F-P SLD at the ONU with the PON employing the single-port laser modulators SLAM at the ONU, and concludes that the PON with the injection-locked F-P SLD is more cost-effective. Kim et al compared two PON systems. But, Kim et al does not state that if the F-P SLD is used at the remote node (or the access node, or kerb location), a SLAM must be used at the ONU. That is, Kim never state that the PON have only two choices: either F-P SLD or SLAM. As disclosed by Morales et al, the data modulated optical signal with wavelength λa is sent to the access node AN from a ONU; Morales et al does not state that a SLAM structure is used in the ONU. The SLAM is just one of the components that can be used in the PON system. Therefore, the modification of system of Kim is not necessary to “go back to employing single-port laser modulators at thus ONU”.

2). Applicant’s argument – “if F-P SLD's are also used at the ONU side in addition to at the kerb location, it will significantly add system complexity to Kim because the injection light from the Broad-band amplified spontaneous emission (ASE)

source now needs to travel through the optical fibers linking the purported hub and the purported kerb location, and the optical fibers linking the kerb location and the ONU".

Examiner's response – The combination of Morales and Kim and Stubkiaer teaches to put the injection-locked laser source at the kerb location for wavelength conversion. And Morales et al already discloses a laser source at the ONU that sends the data modulated optical signal; and the ONUs are "very simple and identical network terminating units since they all work at the same wavelength". The injection-locked sources and "the injection light from the Broad-band amplified spontaneous emission" are used to get multiple wavelengths, and each F-P SLD transmits signal at different wavelength, and then WDM signals are transmitted to the hub. However, the ONU uses "the same wavelength", and the wavelength conversion occurs at the kerb location; therefore, there is no use to also use the injection locked F-P SLD, which is injected locked by a broadband light source, at the ONU. That is, the situation such as "significantly add system complexity" as applicant argued does not exist.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 4, 8-10, 13-16, 19, 21, 23, 30, 32 and 33 rejected under 35 U.S.C. 103(a) as being unpatentable over Morales et al (US 5,706,111) in view of Kim et al

(Kim et al: "A Low-Cost WDM Source with ASE Injected Fabry-Perot Semiconductor Laser", IEEE Photonics Technology Letters, Vol. 12, No. 8, August 2000, page 1067-1069) and Stubkjaer (Stubkjaer: "Semiconductor Optical Amplifier-Based All-Optical Gates for High-Speed Optical Processing", IEEE Journal on Selected Topics in Quantum Electronics, Vol. 6, No. 6, November/December 2000, pages 1428-1435).

1). With regard to claim 1, Morales et al discloses an optical data transmission system (e.g., Figures 2 and 3), comprising:

a hub (e.g., the switch center CE in Figure 2);

a kerb location (the access node AN in Figure 2) having an optical router (the multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23, the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE) and a plurality of optically pumped sources (e.g., the OAB in Figure 2; Morales et al discloses that "the conversion to electrical signals takes place <u>only</u> in the network terminating equipment to which the subscriber terminals are connected", column 3, line 63-65; and "consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks", column 1, line 16-20; therefore, a plurality of optically pumped sources are presented in the AN); and

a plurality of optical network units (e.g., the optical network terminals ONT in Figure 2) each corresponding to one of the plurality of optically pumped sources (e.g., OAB in Figure 2), wherein each optical network unit has a laser for producing data

modulated pumping light for transmission to its respective optically pumped source (the laser in each ONT generates data modulated pumping light, e.g., λ_a , or λ_d or λ_e in Figure 2, to the OAB);

wherein the optical router is configured to route wavelength channels to the hub (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub), and

wherein the data modulated pumping light is passively converted into the distinct wavelength channels, performed without any intermediate conversion to or from an electrical signal (Morales et al discloses that “the conversion to electrical signals takes place <u>only</u> in the network terminating equipment to which the subscriber terminals are connected”, column 3, line 63-65; and “consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks”, column 1, line 16-20; therefore, the data modulated pumping light is passively converted into the distinct wavelength channels, performed without any intermediate conversion to or from an electrical signal).

But, Morales et al does not expressly state that the kerb location is a passive kerb location; wherein each optically pumped source is configured to receive injection light from an injection source outside the passive kerb location and to receive the data modulated pumping light from its respective optical network unit, wherein the plurality of optically pumped sources is configured to form data modulated transmission light at a

predefined wavelength range assigned to its respective optical network unit, wherein the data modulated transmission light is based on the injection light and the data modulated pumping light, wherein each predefined wavelength range corresponds to a distinct wavelength channel.

However, Kim et al teaches a plurality of injection-locked sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the Broad-band ASE source in Figures 1 and 5) outside the passive kerb location and to receive the data modulated pumping signal (e.g., the PRBS in Figure 1) from its respective optical network unit, wherein the injection-locked source is configured to form data modulated transmission light (the light sent from F-P SLD to the AWG) at a predefined wavelength range assigned to its respective optical network unit (Figure 5, each ONU assigned a specific wavelength predefined by the ASE source and the AWG) wherein the data modulated transmission light is based on the injection light and the data modulated signal (Figures 1, 2 and 5, the data modulated transmission light is based on the injection light due to the injection locking, and the data is modulated on the transmission light) and the data modulated signal, wherein each predefined wavelength range corresponds to a distinct wavelength channel (the AWG slices the broad band ASE source and routes the individual wavelength to respective F-P SLD).

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is "optically pumped source".

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in

which a data signal $\lambda 1$ pumps the optically pumped source (Optical gate, the injection light is CW light $\lambda 2$).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim at al and Stubkjaer teaches an optically pumped injection-locked light source. And Kim et al and Stubkjaer teach a cost-effective and highly reliable and flexible optical WDM system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection-locked light source as taught by Kim et al and Stubkjaer to the access node (or kerb location) of Morales et al so that a passive kerb location can be obtained and a cost-effective and highly reliable and flexible WDM network can be realized.

2). With regard to claim 4, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein the data modulated pumping light is within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e, and the wavelength channels are λ_1, λ_2 , … λ_m , Figure 2 of Morales).

3). With regard to claim 8, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein respective ones of the optical network units are sufficiently similar so that they are interchangeable (column 3, line 13-18, and column 4 line 59-67, the ONTs are identical to each other).

4). With regard to claim 9, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein the optically pumped sources are injection locked lasers (the F-P SLD as in Figures 1 and 5 of Kim) configured to receive injection light (the light from the Broad-band ASE source in Figures 1 and 5), and wherein the injection source of the injection light is upstream from the passive kerb location (e.g., the injection light is from the center office, Figure 5).

5). With regard to claim 10, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein an injection wavelength is selected by at least one of a wavelength division multiplexer or an arrayed waveguide grating (e.g., the AWG in Figure 1 and 5 of Kim et al select the injection wavelength).

6). With regard to claim 13, Morales et al and Kim et al and Stubkjaer to disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein the data modulated pumping light is at a wavelength different from the wavelength of light used to carry data traffic in upstream from the kerb location and downstream from the hub (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e, and the wavelength used to carry data traffic in upstream and downstream directions are λ_1, λ_2 , … λ_m , Figure 2 of Morales).

7). With regard to claim 14, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein the optical router comprises a wavelength division multiplexer multiplexer (the

multiplexer in the AN/OAB, the multiplexer multiplexes the m different wavelengths, $\Sigma\lambda_i$, over one of the optical fibers to the CE: column 4, line 27, and column 5 line 22-23).

8). With regard to claim 15, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein the optical router comprises an arrayed wavelength grating (e.g., the AWG in Figure 1 and 5 of Kim et al can be the optical router).

9). With regard to claim 16, Morales et al discloses a method of optically transmitting data, the method comprising:

receiving data modulated pumping light from a plurality of optical network units (e.g., Figure 2, the access node AN receives data modulated pumping light, e.g., λ_a , or λ_d or λ_e from the ONTs) at a kerb location (the access node AN in Figure 2) in an optical data transmission system (e.g., Figures 2 and 3), wherein the kerb location comprises a plurality of optically pumped sources each assigned to a respective optical network unit (e.g., Figure 2, each OAB is assigned to respective ONU; and the OAB converts the data modulated pumping light, e.g., λ_a, from each optical network unit into data modulated transmission light, e.g., λ_i);

wherein each optical network unit is assigned a distinct predefined wavelength range for its data modulated transmission light corresponding to a distinct wavelength channel (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e, and the wavelength channels are λ_1, λ_2 , …λ_m , Figure 2 of Morales; the OAB converts the data modulated pump signal, e.g., λ_a, into data modulated wavelength channel, e.g., λ_i); and wherein said converting is performed without an intermediate conversion to or from an

electrical signal (Morales et al discloses that “the conversion to electrical signals takes place only in the network terminating equipment to which the subscriber terminals are connected”, column 3, line 63-65; and “consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks”, column 1, line 16-20; therefore, the data modulated pumping light is passively converted into the distinct wavelength channels, performed without any intermediate conversion to or from an electrical signal); and

routing the wavelength channels each having distinct predefined wavelength ranges assigned to respective optical network units for transmission to a hub with a passive optical router (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub).

But, Morales et al does not expressly state that the kerb location is a passive kerb location; and receiving injection light from an injection source at the passive kerb location, wherein each optically pumped source includes a laser cavity configured to select a distinct resonance peak of an incident light, and wherein the optically pumped sources are configured to form data modulated transmission light based on the injection light and the data modulated pumping light; and passively converting the data modulated pumping light from each optical network unit into data modulated transmission light based on the injection light and the data modulated pumping light.

However, Kim et al teaches a plurality of injection-locked sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the Broad-band ASE source in Figures 1 and 5) outside the passive kerb location. The injection locked sources (the F-P SLD in Figures 1 and 5) including a plurality of laser cavities (Fabry-Perot Laser cavity in Figures 1 and 5) configured to select a distinct resonance peak of an incident light (the injection light from the broad-band source and AWG determine the appropriate resonance peak of the F-P laser, Figure 2); and injection locking sources configured to form data modulated transmission light based on the injection light and the data pumping signal (Figure 1, 2 and 5); and passively converting the data signals from each optical network unit (the ONU in Figures 1) into data modulated transmission light (the signals sent from F-P SLD to the AWG) based on the injection light and the data signals.

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is “optically pumped source”.

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in which a data signal $\lambda 1$ pumps the optically pumped source (Optical gate, the injection light is CW light $\lambda 2$).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim at al and Stubkjaer teach an optically pumped injection locked light source. And Kim et al and Stubkjaer teach a cost-effective and highly reliable and flexible optical WDM

system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection locking light source as taught by Kim et al and Stubkjaer to the access node (or kerb location) of Morales et al so that a passive kerb location can be obtained and a cost-effective and highly reliable and flexible WDM network can be realized.

10). With regard to claim 19, Morales et al discloses an optical data transmission system (e.g., Figures 2 and 3), comprising:

receiving means for receiving data modulated transmission light, at a passive kerb location from a plurality of optical network units (e.g., Figure 2, the access node AN receives data modulated pumping light, e.g., λ_a , or λ_d or λ_e from the ONTs), wherein the kerb location comprises a plurality of optically pumped sources each assigned to a respective optical network unit (e.g., Figure 2, each OAB is assigned to respective ONU).

converting means (e.g., the OAB in Figure 2) for passively converting the data modulated transmission light from each optical network unit into data modulated transmission light (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e, and the data modulated transmission light are λ_1, λ_2 , … λ_m , Figure 2), wherein each optical network unit is assigned a predefined wavelength range for its data modulation transmission light corresponding to a distinct wavelength channel (λ_1, λ_2 , … λ_m , Figure 2), and wherein the converting means does not convert the data modulated transmission light to or from an electrical signal (Morales et al discloses that "the conversion to electrical signals takes place <u>only</u> in the network terminating equipment to

which the subscriber terminals are connected”, column 3, line 63-65; and “consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks”, column 1, line 16-20; therefore, the data modulated pumping light is passively converted into the distinct wavelength channels, and the OAB does not convert the data modulated transmission light to or from an electrical signal); and

routing means for routing the wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to a hub with an optical router (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub).

But, Morales et al does not expressly state that the kerb location is a passive kerb location; and the optically pumped source includes a laser cavity configured to select a distinct resonance peak of an incident light, and wherein the optically pumped sources are configured to form data modulated transmission light based on the injection light and the data modulated pumping light; converting means for passively converting the data modulated transmission light from ONU into data modulated transmission light based on the injection light and the data modulated pumping light.

However, Kim et al teaches a plurality of injection-locked sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the Broad-band ASE source in Figures 1 and 5) outside the passive kerb location. The

injection locked sources (the F-P SLD in Figures 1 and 5) including a plurality of laser cavities (Fabry-Perot Laser cavity in Figures 1 and 5) configured to select a distinct resonance peak of an incident light (the injection light from the broad-band source and AWG determine the appropriate resonance peak of the F-P laser, Figure 2); and the injection locked sources are configured to form data modulated transmission light based on the injection light and the data pumping signal (Figure 1 and 5); and passively converting the data signals from each optical network unit (the ONU in Figures 1) into data modulated transmission light (the signals sent from F-P SLD to the AWG) based on the injection light and the data signals.

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is “optically pumped source”.

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in which a data signal $\lambda 1$ pumps the optically pumped source (Optical gate, the injection light is CW light $\lambda 2$).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim at al and Stubkjaer teach an optically pumped injection locked light source. And Kim et al and Stubkjaer teach a cost-effective and highly reliable and flexible optical WDM system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection locking light source as taught by Kim et al and Stubkjaer to the access node (or kerb location) of Morales et al so that a

passive kerb location can be obtained and a cost-effective and highly reliable and flexible WDM network can be realized.

11). With regard to claim 21, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 16 above. And Morales et al further discloses the method comprising optically pumping, at the kerb location, the plurality of optically pumped sources with the plurality of respective data modulated pumping light (the data signals as pump signal are optical signals with wavelength λ_a , or λ_d or λ_e, Figure 2 of Morales).

12). With regard to claim 23, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 16 above. And Morales et al further discloses wherein the data modulated pumping light signals are is within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e, and the wavelength used to carry data traffic in upstream and downstream directions are λ_1, λ_2 , … λ_m , Figure 2 of Morales).

13). With regard to claim 30, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And Morales et al further discloses the method comprising pumping means for optically pumping the plurality of optically pumped sources at the kerb location (e.g., the optical wavelength converter in OAB Figure 2 of Morales et al).

14). With regard to claim 32, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And Morales et al further

discloses wherein the optical signals are within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e, and the wavelength used to carry data traffic in upstream and downstream directions are λ_1, λ_2 , ... λ_m , Figure 2 of Morales).

15). With regard to claim 33, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein the injection light is amplified spontaneous emission noise produced by an upstream preamplifier (e.g., the broad-band ASE source of Kim et al).

4. Claims 11, 12, 20 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morales et al (US 5,706,111) and Kim et al (Kim et al: “A Low-Cost WDM Source with ASE Injected Fabry-Perot Semiconductor Laser”, IEEE Photonics Technology Letters, Vol. 12, No. 8, August 2000, page 1067-1069) and Stubkjaer (Stubkjaer: “Semiconductor Optical Amplifier-Based All-Optical Gates for High-Speed Optical Processing”, IEEE Journal on Selected Topics in Quantum Electronics, Vol. 6, No. 6, November/December 2000, pages 1428-1435) as applied to claims 1, 9, 10 above, and in further view of Zah (US 6,434,175).

1). With regard to claim 11, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. But Morales and Kim et al and Stubkjaer do not expressly disclose wherein the optically pumped sources comprise external cavity lasers.

However, the external cavity laser is well known in the art. Zah teaches such a laser, a multiwavelength laser includes a multiplexer (inside the laser cavity) for providing wavelength accuracy and reflectors for forming laser cavity (Figure 1, column 2, line 5-10, and column 3 line 58 to column 4 line 34). Zah teaches a plurality of optical gain sources (e.g., the optical gain medium 118 in Figure 1), the optical gain sources each comprising an external laser cavity (laser cavity 142 is formed by the mirror 136 and facet 332 in Figure 1), mirrors defining the cavity (the mirror 136 and facet 332 define the external cavity).

Zah provide laser with a high wavelength accuracy and selectivity, simplified packaging and compactness, without complications, to support the DWDM applications. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the external cavity laser as taught by Zah to the system of Morales et al and Kim et al and Stubkjaer so that a compact, high wavelength accuracy and selectivity multiwavelength laser system can be obtained.

2). With regard to claim 12, Morales et al and Kim et al and Stubkjaer and Zah disclose all of the subject matter as applied to claims 1 and 11 above. And the combination of Morales and Kim et al and Stubkjaer and Zah further discloses wherein the optical router is within a laser cavity of at least one optically pumped source (Zah: the multiplexer PHASAR MUX/the wavelength router, is inside the laser cavity).

3). With regard to claim 20, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. But Morales and Kim et al and Stubkjaer do not expressly disclose the optically pumped sources each comprising a

laser cavity, mirrors defining the cavity, and wavelength selective elements inside the cavity.

However, a laser cavity with the wavelength selective element inside, such as the phasar laser, is well known and widely practice in the art. Zah teaches such a laser, a multiwavelength laser includes a multiplexer (PHASAR MUX inside the laser cavity) for providing wavelength accuracy and reflectors for forming laser cavity (Figure 1, column 2, line 5-10, and column 3 line 58 to column 4 line 34). Zah teaches a plurality of optical gain sources (e.g., the optical gain medium 118 in Figure 1), the optical gain sources each comprising a laser cavity (laser cavity 142 is formed by the mirror 136 and facet 332 in Figure 1), mirrors defining the cavity (the mirror 136 and facet 332 define the cavity), and wavelength selective elements (the phasar multiplexer 320 inside the cavity).

Morales et al and Kim et al and Stubkjaer teach a cost-effective WDM PON system. Zah provides laser with a high wavelength accuracy and selectivity, simplified packaging and compactness, without complications, to support the DWDM applications. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the laser cavity as taught by Zah to the system of Morales et al and Kim et al and Stubkjaer so that a cost-effective, compact, high wavelength accuracy and selectivity multiwavelength laser system can be obtained.

3). With regard to claim 34, Morales et al and Kim et al and Stubkjaer and Zah disclose all of the subject matter as applied to claims 1 and 11 above. And Zah further disclose wherein the external cavity laser is formed from narrow band reflectors. (e.g.,

the DBR 936 in Figure 8; although Zah calls the DBR 936 a broad band mirror, the DBR 936 can be viewed as a narrow band reflectors with respect to the broad band ASE source. In applicant's disclosure, the “narrow band reflectors”, e.g., the reflector in Figure 8 or 1020 in Figure 10, have to pass all wavelengths $\lambda 1$ to λk, therefore, the reflector is not exactly “narrowband” reflector in conventional definition).

Allowable Subject Matter

5. Claims 35, 36 and 38-42 are allowed.

6. Claims 43 and 44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Monday-Friday, 8:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. L./
Examiner, Art Unit 2613
January 26, 2009

/Kenneth N Vanderpuye/
Supervisory Patent Examiner, Art Unit 2613